



RAYSTAR

RAYSTAR Optronics, Inc.  
曜凌光電股份有限公司



# 曜凌光電股份有限公司 Raystar Optronics, Inc.

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## RFK1010L-BYH-LNG

### SPECIFICATION

CUSTOMER:

<b>APPROVED BY</b>	
<b>PCB VERSION</b>	
<b>DATE</b>	

FOR CUSTOMER USE ONLY

<b>SALES BY</b>	<b>APPROVED BY</b>	<b>CHECKED BY</b>	<b>PREPARED BY</b>

Release DATE:

TFT Display Inspection Specification: <https://www.raystar-optronics.com/download/products.htm>  
Precaution in use of TFT module: <https://www.raystar-optronics.com/download/declaration.htm>

## Revision History

VERSION	DATE	REVISED PAGE NO.	Note
0	2023/01/10		First issue

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# 1.Module Classification Information

<b>R</b>	<b>F</b>	<b>K</b>	<b>101</b>	<b>0L</b>	<b>-</b>	<b>B</b>	<b>Y</b>	<b>H</b>	<b>-</b>	<b>L</b>	<b>N</b>	<b>G</b>
1	2	3	4	5	-	6	7	8	-	9	10	11

Item	Description	
1	R : Raystar Optronics Inc.	
2	Display Type : F→TFT Type, J→ Custom TFT	
3	Solution: A: 128x160    B:320x234    C:320x240    D:480x234    E:480x272 F:800x480    G:640x480    H:1024x600    I:320x480    J:240x320 K:1280x800    L:240x400    M:1024x768    N:128x128    O:480x800 P:640x320    Q:800x600    S:480x128    T:800x320	
4	Display Size : 10.1" TFT	
5	Version Code.	
6	Model Type: A : TFT LCD E : TFT+FR+CONTROL BOARD J : TFT+FR+A/D BOARD N : TFT+FR+A/D BOARD+CONTROL BOARD S : TFT+FR+POWER BOARD (DC TO DC) 1 : TFT+CONTROL BOARD	6 : TFT+FR H : TFT+D/V BOARD I : TFT+FR+D/V BOARD B : TFT+POWER BD
7	Polarizer Type, Temperature range, View direction	I→Transmissive, W. T, 6:00 ;    C→Transmissive, N. T, 6:00 L→Transmissive, W.T,12:00 ;    F→Transmissive, N.T,12:00 Y→Transmissive,W.T, IPS TFT ; A→Transmissive, N.T, IPS TFT Z→Transmissive, W.T, O-TFT R→Transmissive, Super W.T, O-TFT N→Transmissive, Super W.T, 6:00; Q→Transmissive, Super W.T, 12:00 V→Transmissive, Super W.T, VA TFT
8	Backlight	W : LED, White                          H : LED, High Light White F : CCFL, White
9	Driver Method	D: Digital    A: Analog    L : LVDS    M:MIPI
10	Interface	N : without control board    A : 8Bit    B : 16Bit S:SPI Interface    R: RS232    U:USB    I: I2C
11	TS	N : Without TS    S : resistive touch panel C : capacitive touch panel    capacitive touch panel (G-F-F) G : capacitive touch panel(G-G)

## 2.Summary

TFT 10.1” is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.1 inch diagonally measured active display area with HD (1280 horizontal by 800 vertical pixel) resolution.

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### 3. General Specifications

- Screen Diagonal: 10.1 inch
- Number of Pixels: 1280 x 3(R GB) x 800 dots
- Module dimension: 257.96 x 168.6 x 25.88 mm
- Active area: 216.96 (H) x 135.6(V) mm
- Pixel pitch: 0.1695 × 0.1695 mm
- Display Mode: Normally Black , Transmissive
- Viewing Angle: 80/80/80/80
- Pixel Arrangement: R.G.B. Vertical Stripe
- TFT Drive IC: EK79202B1 or Equivalent
- Backlight Type: LED, Normally White
- Aspect Ratio: 16:10
- Interface: LVDS
- CTP FW Version: 80
- CTP IC: GT928 or equivalent
- CTP Interface: I2C
- CTP Resolution: 1280\*800
- With /Without TP: With CTP
- Surface: Glare

\*Color tone slight changed by temperature and driving voltage.

## 4.Interface

### 4.1. LCM PIN Definition

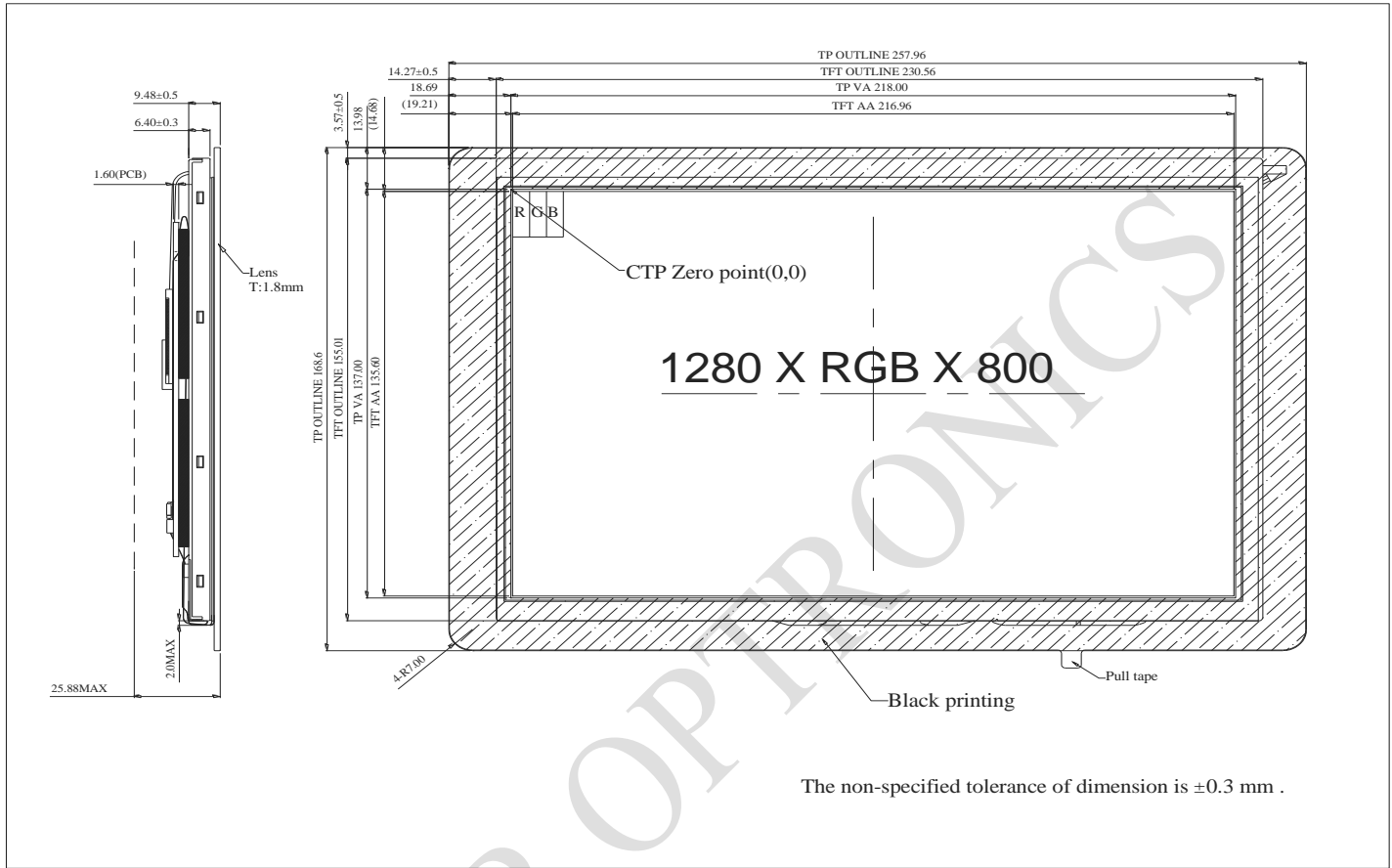
Pin No.	Symbol	I/O	Function	Remark
1	DC12V	P	Power Supply	
2	DC12V	P	Power Supply	
3	DC12V	P	Power Supply	
4	NC	-	No connection	
5	GND	P	Ground	
6	GND	P	Ground	
7	GND	P	Ground	
8	Rxin0-	I	-LVDS Differential Data Input	R0-R5,G0
9	Rxin0+	I	+LVDS Differential Data Input	
10	GND	P	Ground	
11	Rxin1-	I	-LVDS Differential Data Input	G1G5,B0,B1
12	Rxin1+	I	+LVDS Differential Data Input	
13	GND	P	Ground	
14	Rxin2-	I	-LVDS Differential Data Input	B2-B5,HS,VS, DE
15	Rxin2+	I	+LVDS Differential Data Input	
16	GND	P	Ground	
17	RxCLK-	I	-LVDS Differential Clock Input	LVDS CLK
18	RxCLK+	I	+LVDS Differential Clock Input	
19	GND	P	Ground	
20	Rxin3-	I	-LVDS Differential Data Input	R6,R7,G6,G7, B6,B7
21	Rxin3+	I	+LVDS Differential Data Input	
22	GND	P	Ground	
23	PWM		This pin is connected to the external LED driver. PWM type control signal for brightness of the LED backlight. If not used, please float this pin.	
24	NC	-	No connection	
25	DC3V	P	Power Supply	
26	NC	-	No connection	
27	GND	P	Ground	

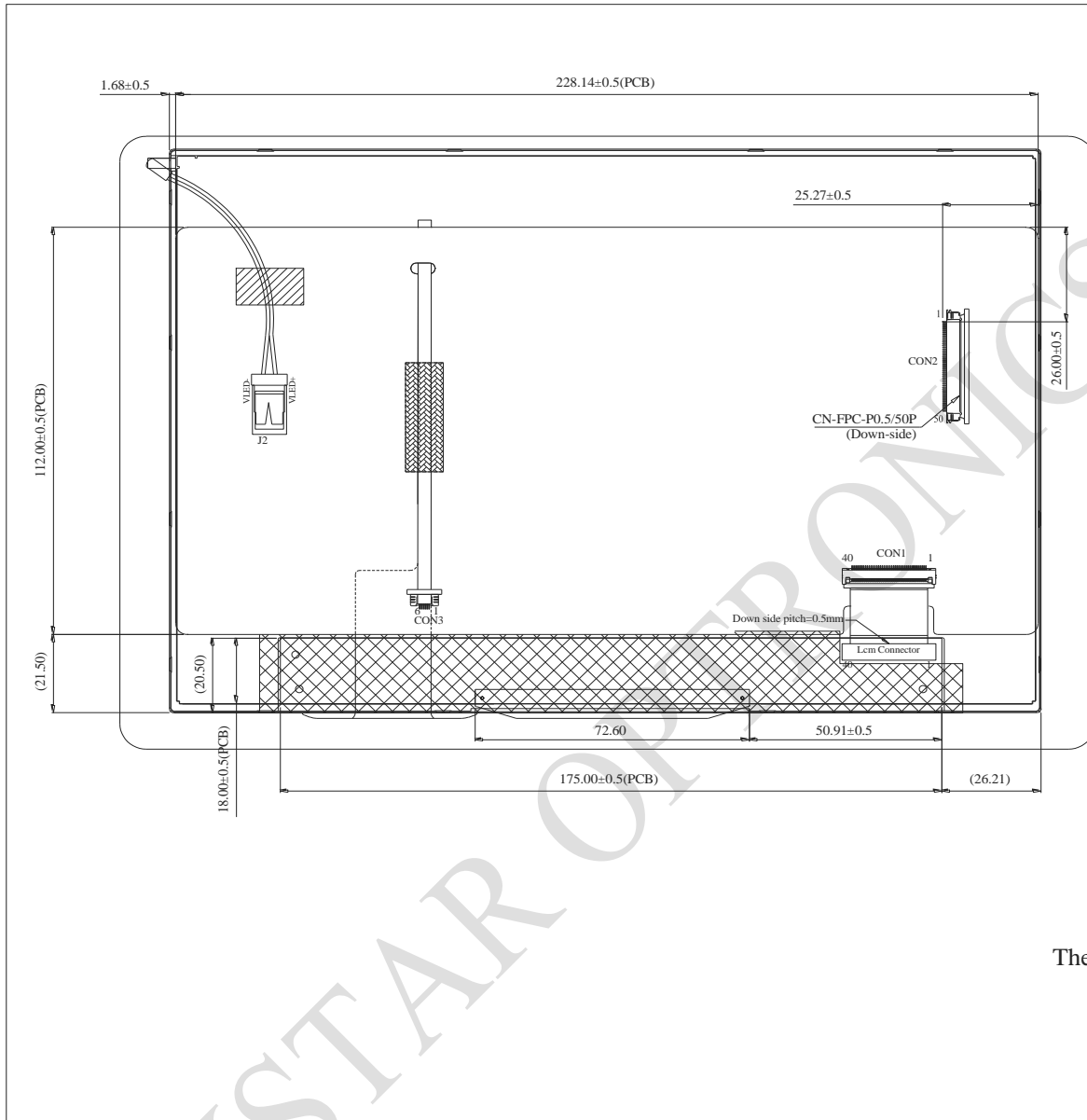


28	SDA	I/O	Serial communication data input.	
29	SCL	I	Serial communication clock input	
30	INT	O	External interrupt to the host	
31	RST	I	External Reset, Low is active	
32	GND	P	Ground	
33~43	NC	-	No connection	
44	GND	P	Ground	
45	GND	P	Ground	
46	GND	P	Ground	
47	NC	-	No connection	
48	DC12V	P	Power Supply	
49	DC12V	P	Power Supply	
50	DC12V	P	Power Supply	

I: input, O: output, P: Power

# 5. Contour Drawing





CON2	PIN NO
	1
	2
	3
	4
	5
	6
	7
	8
	9
	10
	11
	12
	13
	14
	15
	16
	17
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	19
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	21
	22
	23
	24
	25

The non-specified tolerance o

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## 6. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	□
Storage Temperature	TST	-30	—	+80	□

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

- Temp. □60□, 90% RH MAX. Temp. >60□, Absolute humidity shall be less than 90% RH at 60□

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## 7. Electrical Characteristics

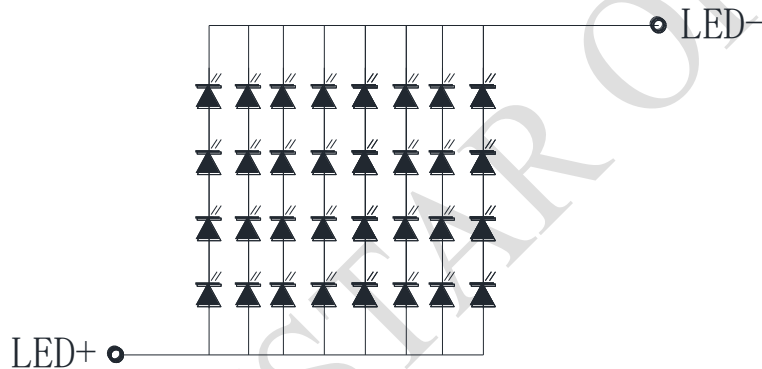
### 7.1. Typical Operation Conditions

Item	Symbol	Min	Typ	Max	Unit	Note
Supply Voltage For LCM +12V	DC12V	—	12.0	—	V	-
Supply Current For LCM +12V	I <sub>DC12V</sub>	—	620	950	mA	-
Supply Voltage For CTP(I2C)	DC3V	3.15	3.3	3.45	V	I2C Type
Supply Current For CTP(I2C)	I <sub>DC3V</sub>	—	14	21	mA	

### 7.2. Backlight Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
PWM Control Level (LED_PWM)	High Level	—	3.3	—	V	Note 5
	Low Level	—	0	—	V	Note 6
PWM Control Duty Ratio	-	1	—	100	%	
PWM Control Frequency	-	—	10K	—	Hz	
LED Life Time	-	50,000	—	—	Hr	Note 2,3,4

Note 1 : There are 1 Groups LED



Note 2 : Ta = 25 °C

Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

Note 5 : Turn ON the backlight when Turn ON BL\_ON = LOW Turn OFF BL\_ON = High

Note 6 : PWM\_BL Control from low active.

## 8.AC Characteristics

### 8.1. LVDS mode AC electrical characteristics

Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
Clock frequency	$R_{xFCLK}$	30	-	TBD	MHz	Refer to input timing table for each display resolution
Input data skew margin	$T_{RSKM}$	500	†	-	ps	$ VID  = 200mV$ $RxVCM = 1.2V$ $RxFCLK = 81MHz$
Clock high time	$T_{LVCH}$	-	$4/(7 * R_{xFCLK})$	-	ns	
Clock low time	$T_{LVCL}$	-	$3/(7 * R_{xFCLK})$	-	ns	
PLL wake-up time	$T_{enPLL}$	-	-	150	us	

Table 1: LVDS mode AC electrical characteristics

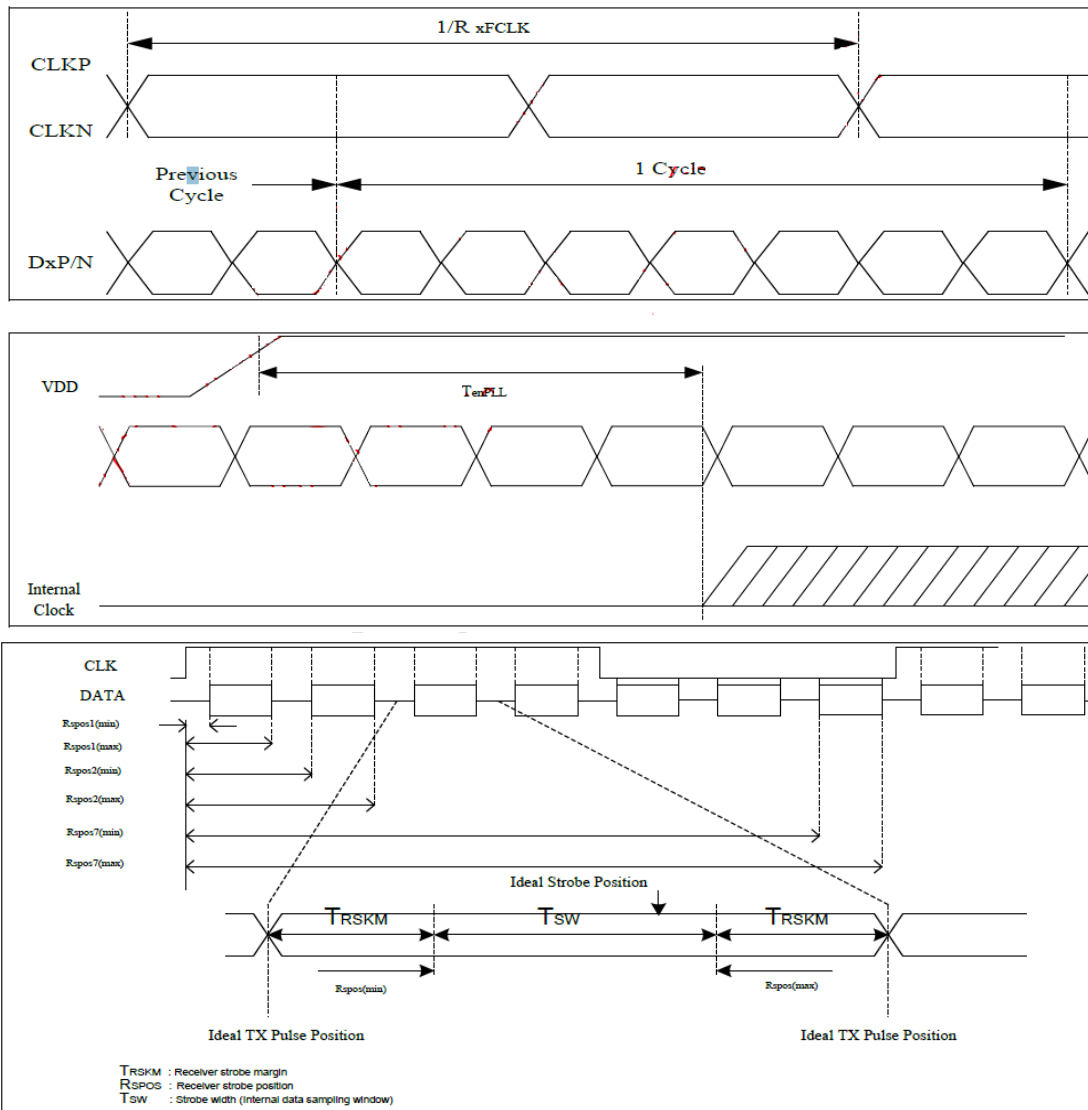
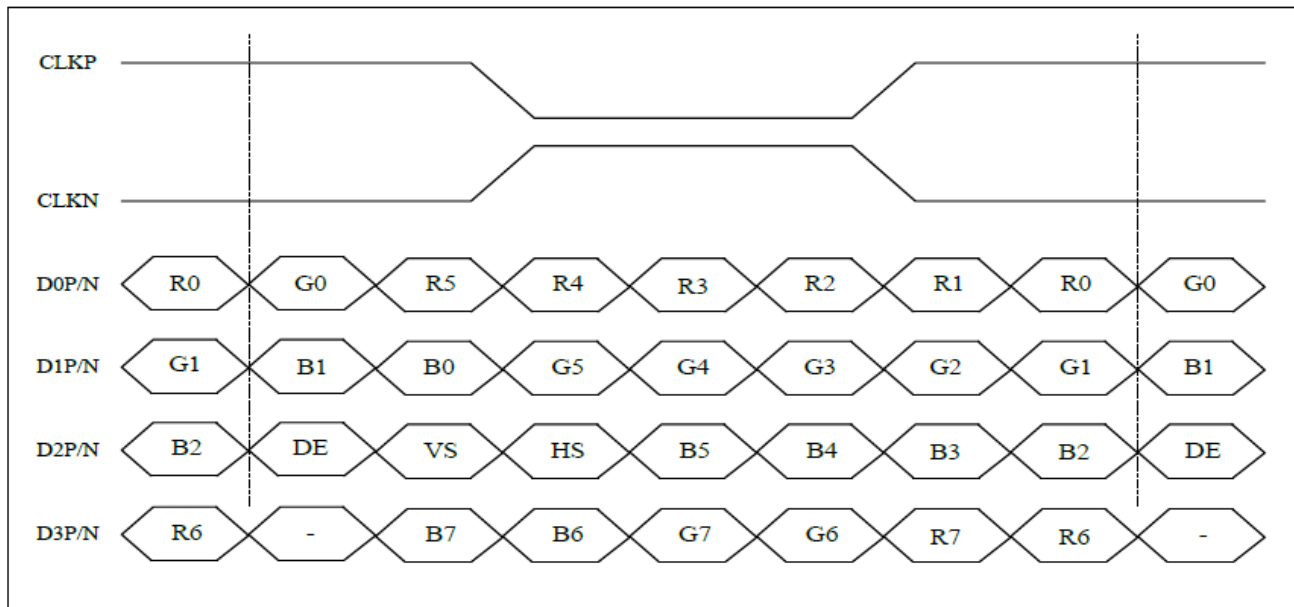


Figure 1: LVDS figure

## 9.LVDS Input Timing Table

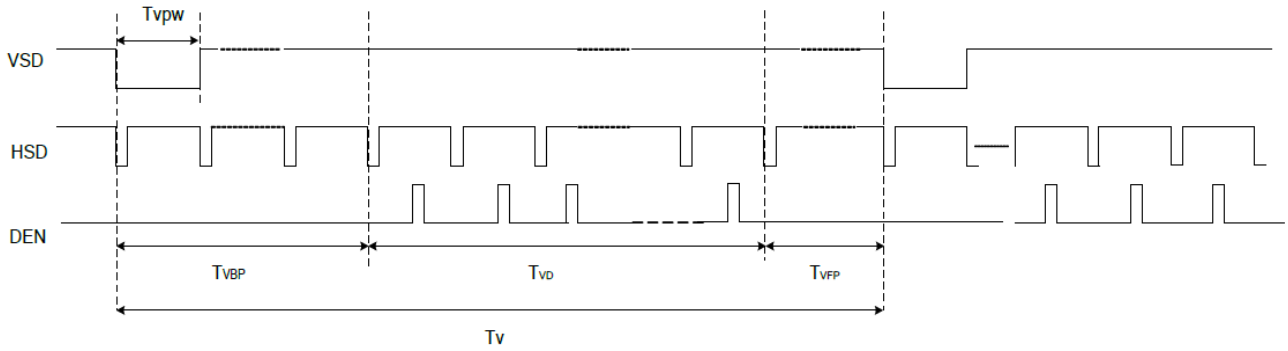
For 1280RGBx800 timing table

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60Hz (LVDS)	$F_{DCLK}$	69.7	75	80.9	MHz
Horizontal display area	$T_{HD}$	1280			DCLK
HSYNC period time	$T_H$	1380	1440	1500	DCLK
HSYNC blanking	$T_{HBP}+T_{HFP}$	100	160	220	DCLK
Vertical display area	$T_{VD}$	800			H
VSYNC period time	$T_V$	842	838	872	H
VSYNC blanking	$T_{VBP}+T_{VFP}$	24	38	72	H

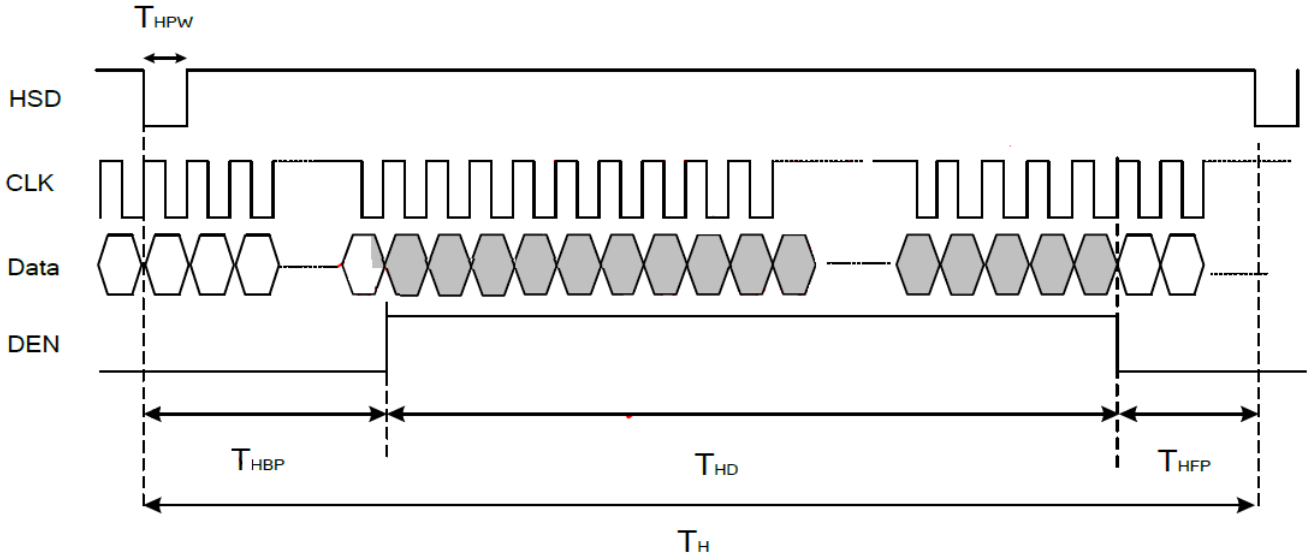


8-bit LVDS input

### Vertical timing



### Horizontal timing



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# 10. Power Sequence

## 10.1. Power Generation

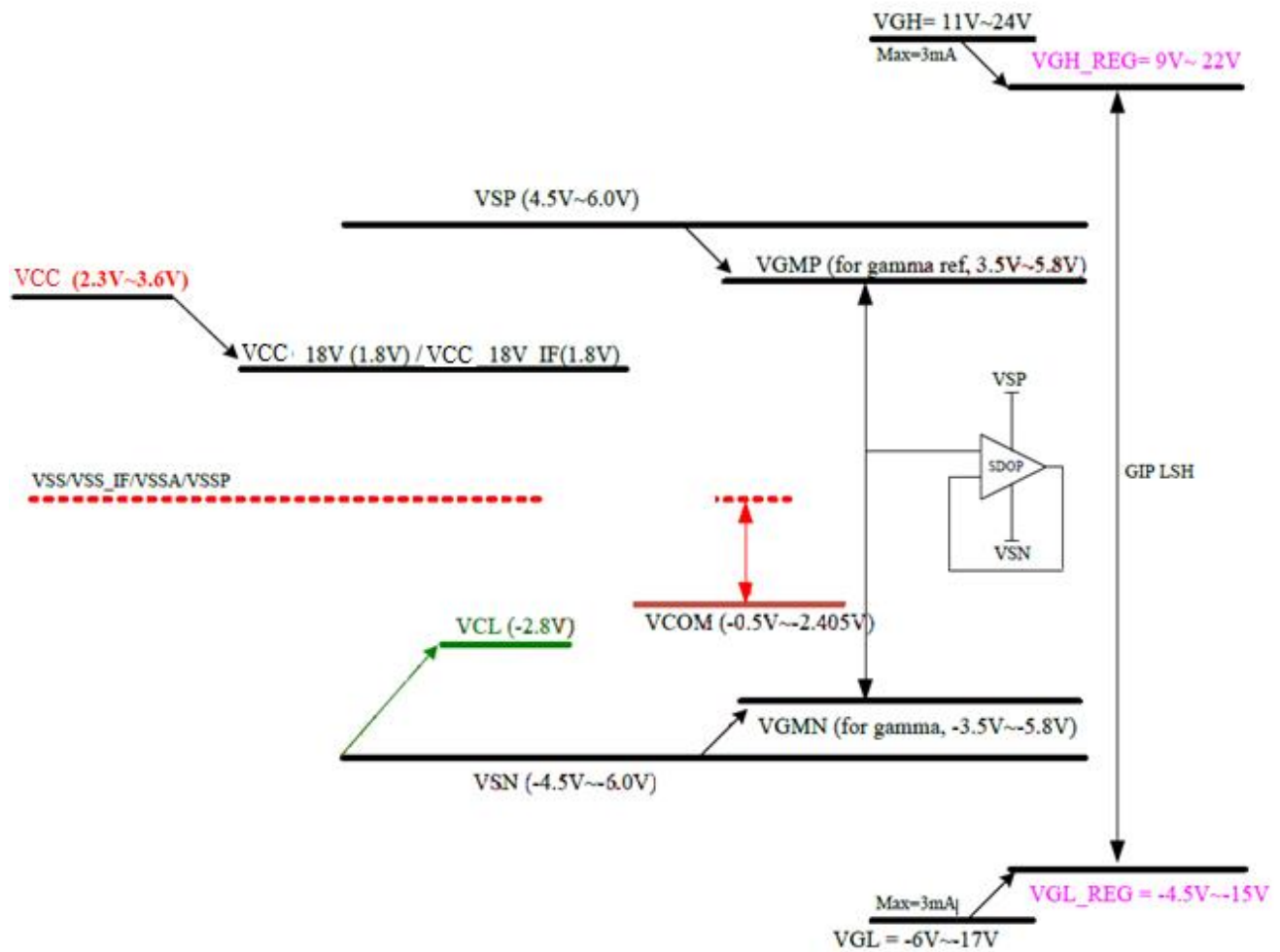
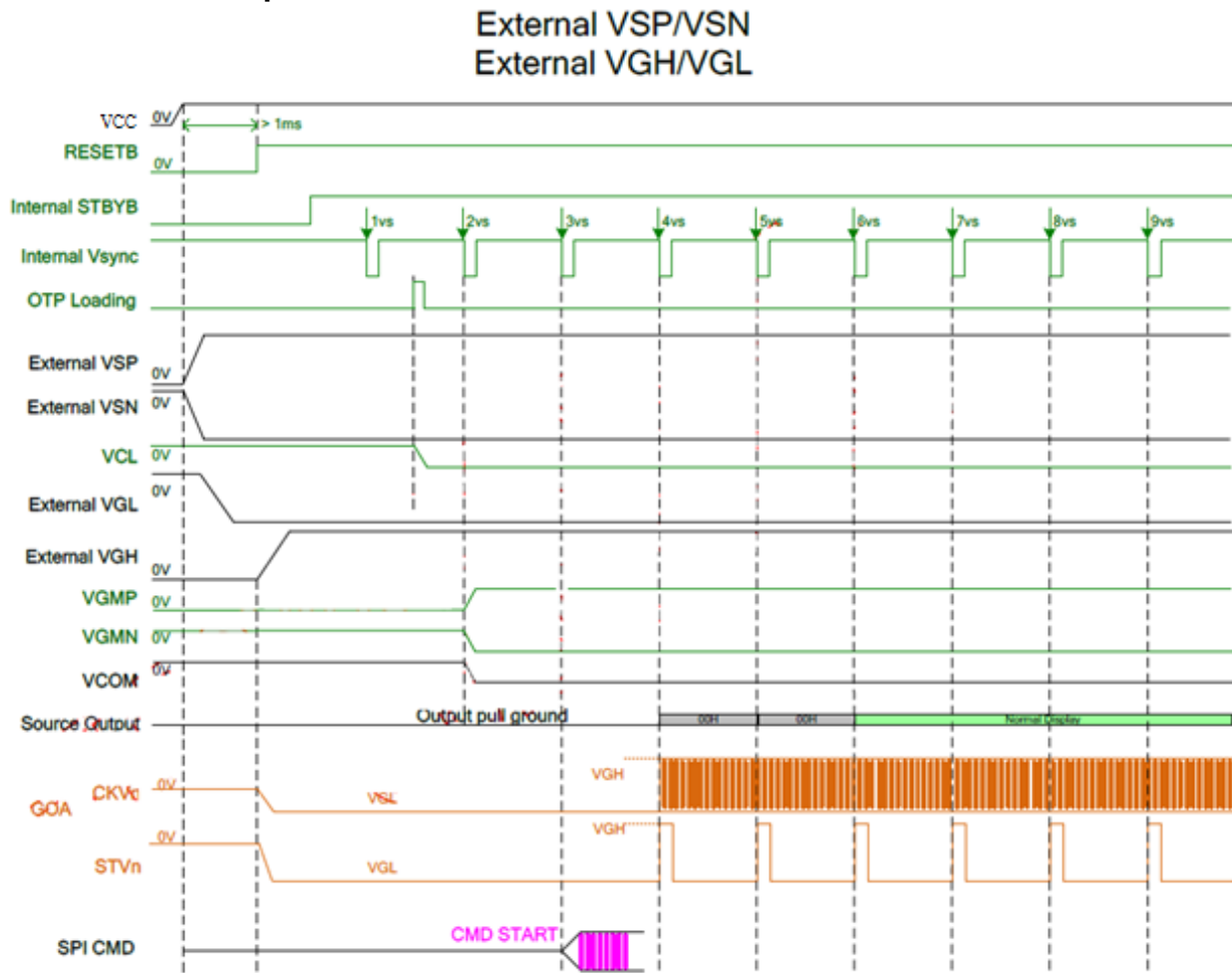


Figure 1 power generation

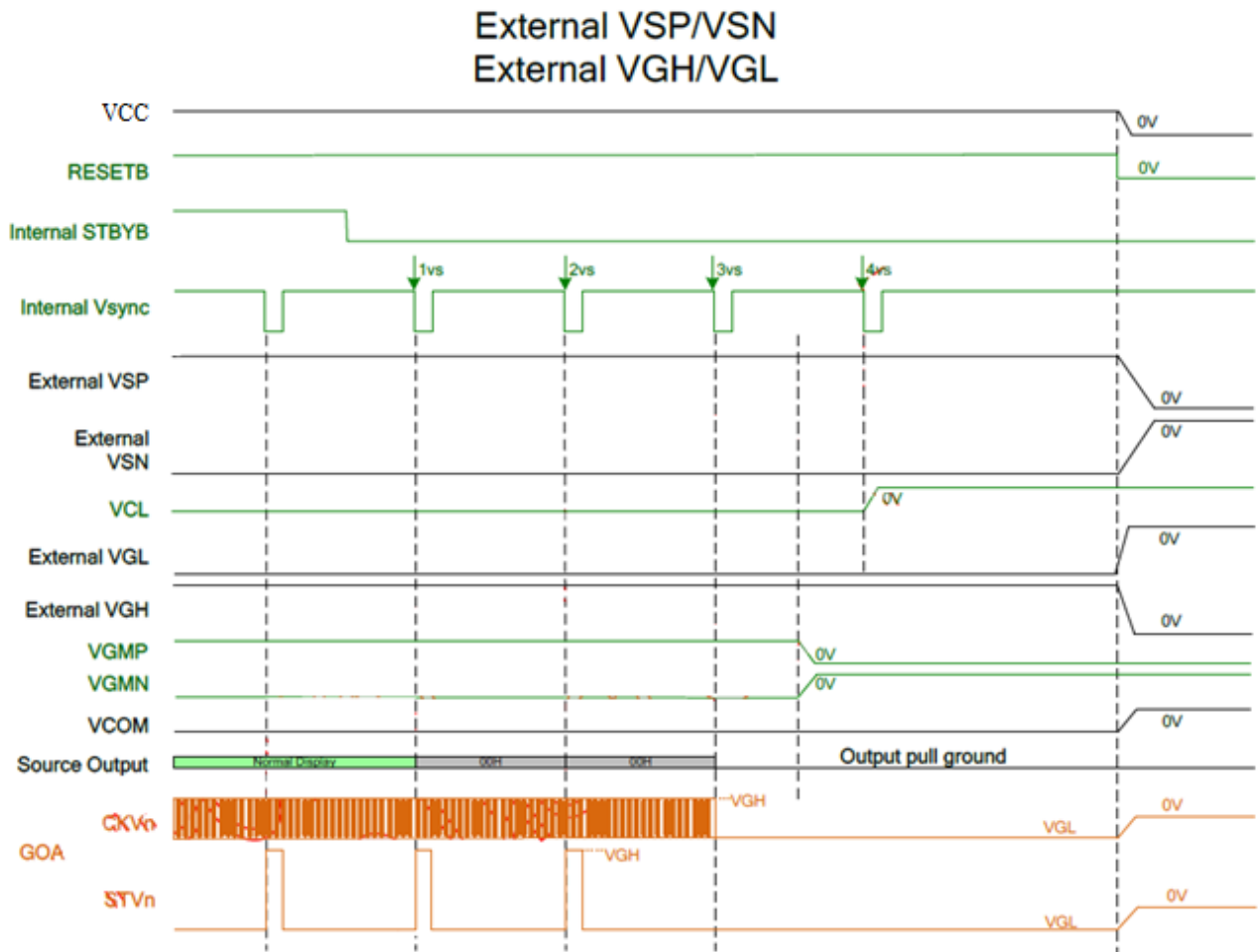
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## 10.2. Power on sequence



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### 10.3. Power off sequence



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## 11. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr+ Tf	$\theta=0^\circ$ 、 $\Phi=0^\circ$	-	25	35	.ms	Note 3	
Contrast ratio	CR	At optimized viewing angle	800	1000	-	-	Note 4	
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\Phi=0$	0.272	0.322	0.372	-	Note 2,6,7
		Wy		0.294	0.344	0.394	-	
Viewing angle	Hor.	$\Theta_R$	$CR \geq 10$	70	80	-	Deg.	Note 1
		$\Theta_L$		70	80	-		
	Ver.	$\Phi_T$		70	80	-		
		$\Phi_B$		70	80	-		
Brightness	-	-	800	900	-	cd/m <sup>2</sup>	Center of display	
Uniformity	(U)	-	70	-	-	%	Note 5	

Ta=25±2°C

Note 1: Definition of viewing angle range

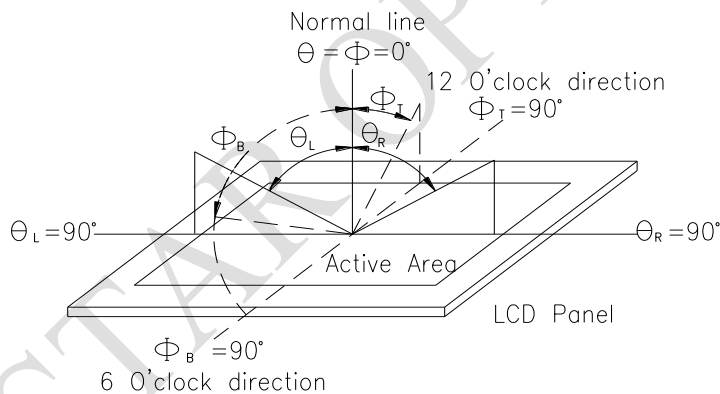


Fig. 11.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

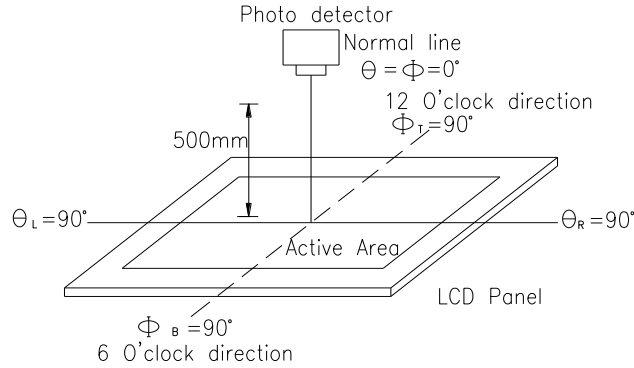
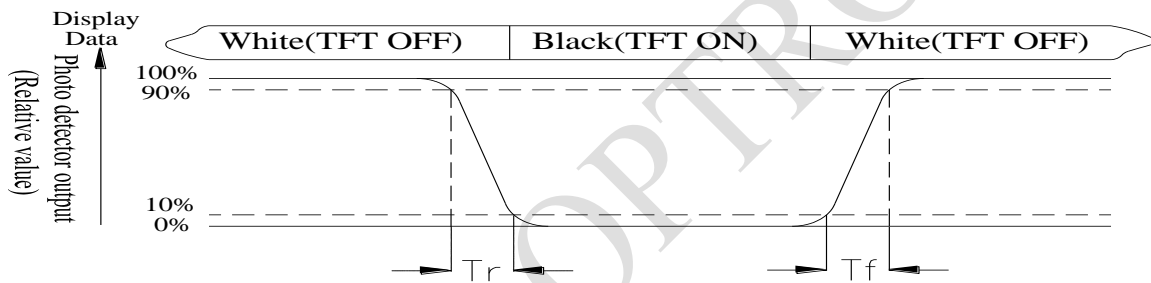


Fig. 11.2. Optical measurement system setup

**Note 3: Definition of Response time:**

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time,  $T_r$ , is the time between photo detector output intensity changed from 90% to 10%. And fall time,  $T_f$ , is the time between photo detector output intensity changed from 10% to 90%


**Note 4: Definition of contrast ratio:**

The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) =  $L_{min}/L_{max} \times 100\%$

L = Active area length

W = Active area width



Fig11.3. Definition of uniformity

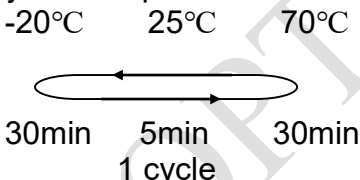
Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

## 12. Reliability

Content of Reliability Test (Wide temperature, -20°C~70°C)

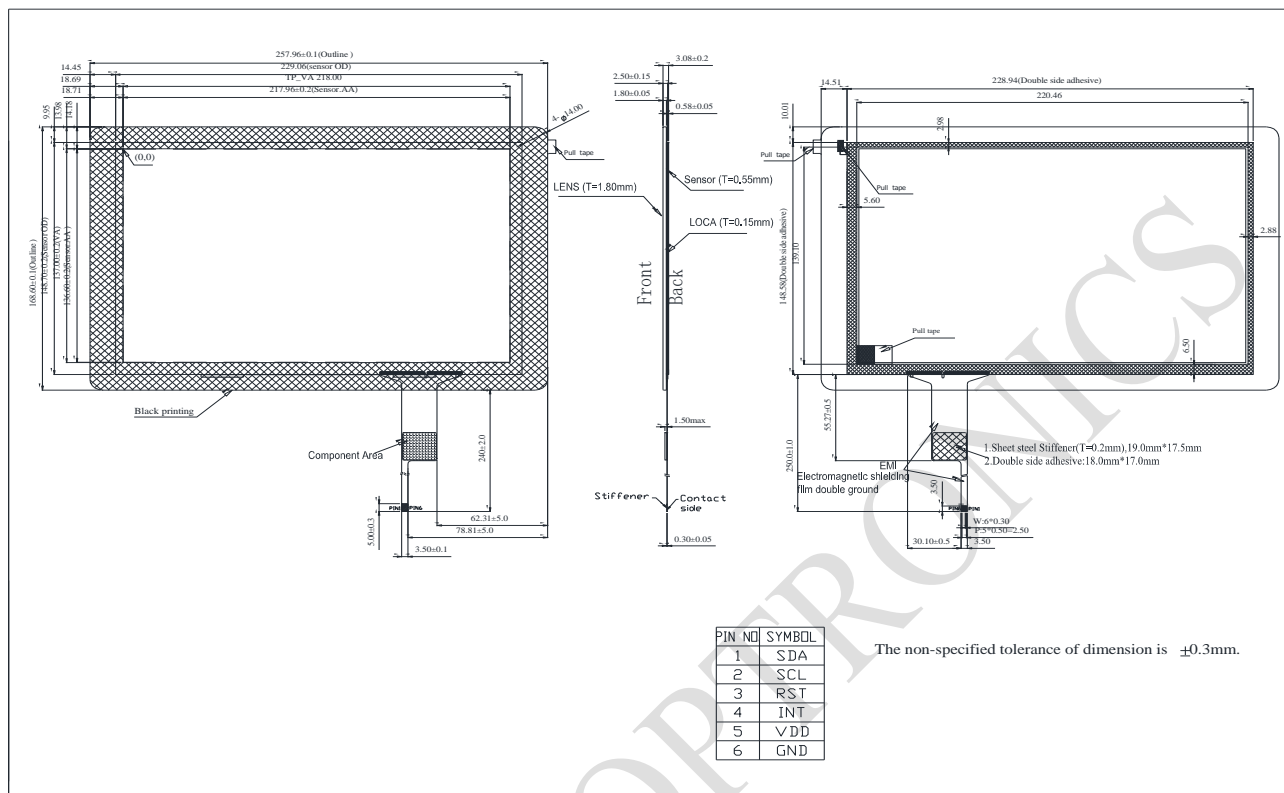
Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation 	-20°C/70°C 10 cycles	—
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the finished product housing.	Contact ±6KV Air ±8KV RS=330Ω CS=150pF 10 times	4

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: The packing have to including into the vibration testing.

## 13.Touch Panel Information





### 13.1. Timing for Read Operation

First, set address pointer based on the aforesaid Write Operation timing sequence. Then, resend Start condition to perform Read addressing and read data in the registers.



Address\_R: Slave address with Read control bit.

NACK: Host issues NACK after reading the last byte.

After setting Read addresses, the host can read one or more than one byte at a time.

GT927/GT928/GT9110 will automatically increase the address pointer and send subsequent data in sequence.

The Stop condition (the first E signal as shown in the above diagram) after setting the address pointer is optional. However, the repeated Start condition has to be sent.

### 13.2. Coordinate registers

Addr	Access	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x8140	R	Product ID( first Byte, ASCII )							
0x8141	R	Product ID( second Byte, ASCII)							
0x8142	R	Product ID( third Byte, ASCII)							
0x8143	R	Product ID( forth Byte, ASCII)							
0x8144	R	Firmware version(HEX.low byte)							
0x8145	R	Firmware version (HEX.high byte)							
0x8146	R	x coordinate resolution (low byte)							
0x8147	R	x coordinate resolution (high byte)							
0x8148	R	y coordinate resolution (low byte)							
0x8149	R	y coordinate resolution (high byte)							

0x814A	R	Vendor_id(ID of the current module)				
0x814B	R	Reserved				
0x814C	R	Reserved				
0x814D	R	Reserved				
0x814E	R/W	buffer status	large detect	Reserved	HaveKey	number of touch points
0x814F	R	track id as 32 indicates HotKnot proximity detection signal				
0x8150	R	PxyOk	Reserved			
0x8151	R	PxyOk	Reserved			
0x8152	R	Reserved				
0x8153	R	Reserved				
0x8154	R	Reserved				
0x8155	R	Reserved				
0x8156	R	Reserved				
0x8157	R	pen_sta	Reserved			track id
0x8158	R	point 1 x coordinate (low byte)				
0x8159	R	point 1 x coordinate (high byte)				
0x815A	R	point 1 y coordinate (low byte)				
0x815B	R	point 1 y coordinate (high byte)				
0x815C	R	Point 1 size (low byte)				
0x815D	R	point 1 size (high byte)				
0x815E	R	Reserved				
0x815F	R	track id				
0x8160	R	point 2 x coordinate (low byte)				
0x8161	R	point 2 x coordinate (high byte)				
0x8162	R	point 2 y coordinate (low byte)				
0x8163	R	point 2 y coordinate (high byte)				
0x8164	R	point 2 size (low byte)				
0x8165	R	point 2 size (high byte)				
0x8166	R	Reserved				
0x8167	R	track id				
0x8168	R	point 3 x coordinate (low byte)				
0x8169	R	point 3 x coordinate (high byte)				
0x816A	R	point 3 y coordinate (low byte)				
0x816B	R	point 3 y coordinate (high byte)				
0x816C	R	point 3 size (low byte)				
0x816D	R	point 3 size (high byte)				
0x816F	R	track id				
0x8170	R	point 4 x coordinate (low byte)				
0x8171	R	point 4 x coordinate (high byte)				
0x8172	R	point 4 y coordinate (low byte)				

0x8173	R	point 4 y coordinate (high byte)
0x8174	R	point 4 size (low byte)
0x8175	R	point 4 size (high byte)
0x8176	R	Reserved
0x8177	R	track id
0x8178	R	point 5 x coordinate (low byte)
0x8179	R	point 5 x coordinate (high byte)
0x817A	R	point 5 y coordinate (low byte)
0x817B	R	point 5 y coordinate (high byte)
0x817C	R	point 5 size (low byte)
0x817D	R	point 5 size (high byte)
0x817E	R	Reserved
0x817F	R	track id
0x8180	R	point 6 x coordinate (low byte)
0x8181	R	point 6 x coordinate (high byte)
0x8182	R	point 6 y coordinate (low byte)
0x8183	R	point 6 y coordinate (high byte)
0x8184	R	point 6 size (low byte)
0x8185	R	point 6 size (high byte)
0x8186	R	Reserved
0x8187	R	track id
0x8188	R	point 7 x coordinate (low byte)
0x8189	R	point 7 x coordinate (high byte)
0x818A	R	point 7 y coordinate (low byte)
0x818B	R	point 7 y coordinate (high byte)
0x818C	R	point 7 size (low byte)
0x818D	R	point 7 size (high byte)
0x818E	R	Reserved
0x818F	R	track id
0x8190	R	point 8 x coordinate (low byte)
0x8191	R	point 8 x coordinate (high byte)
0x8192	R	point 8 y coordinate (low byte)
0x8193	R	point 8 y coordinate (high byte)
0x8194	R	point 8 size (low byte)
0x8195	R	point 8 size (high byte)
0x8196	R	Reserved
0x8197	R	track id
0x8198	R	point 9 x coordinate (low byte)
0x8199	R	point 9 x coordinate (high byte)
0x819A	R	point 9 y coordinate (low byte)
0x819B	R	point 9 y coordinate (high byte)

0x819C	R	point 9 size (low byte)
0x819D	R	point 9 size (high byte)
0x819E	R	Reserved
0x819F	R	track id
0x81A0	R	point 10 x coordinate (low byte)
0x81A1	R	point 10 x coordinate (high byte)
0x81A2	R	point 10 y coordinate (low byte)
0x81A3	R	point 10 y coordinate (high byte)
0x81A4	R	point 10 size (low byte)
0x81A5	R	point 10 size (high byte)
0x81A6	R	Reserved
0x81A7	R	KeyValue

### 13.3. I2C protocol

3.3V ,400BPS ,pull high 2K ohm

<b>Parameter</b>	<b>Symbol</b>	<b>Min.</b>	<b>Max.</b>	<b>Unit</b>
SCL low period	$t_{lo}$	0.9	-	us
SCL high period	$t_{hi}$	0.8	-	us
SCL setup time for START condition	$t_{st1}$	0.4	-	us
SCL setup time for STOP condition	$t_{st3}$	0.4	-	us
SCL hold time for START condition	$t_{hd1}$	0.3	-	us
SDA setup time	$t_{st2}$	0.4	-	us
SDA hold time	$t_{hd2}$	0.4	-	us

**LCM Sample Estimate Feedback Sheet**

**Module Number :** \_\_\_\_\_

**1 、 Panel Specification :**

1. Panel Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. View Direction :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Numbers of Dots :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. View Area :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Active Area :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. Operating Temperature :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Storage Temperature :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
8. Others :	_____	

**2 、 Mechanical Specification :**

1. PCB Size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. Frame Size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Material of Frame :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. Connector Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Fix Hole Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. Backlight Position :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Thickness of PCB :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
8. Height of Frame to PCB :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
9. Height of Module :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
10. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

**3 、 Relative Hole Size :**

1. Pitch of Connector :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. Hole size of Connector :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. Mounting Hole size :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. Mounting Hole Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

**4 、 Backlight Specification :**

1. B/L Type :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2. B/L Color :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3. B/L Driving Voltage (Reference for LED Type) :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4. B/L Driving Current :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5. Brightness of B/L :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6. B/L Solder Method :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7. Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

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Module Number : \_\_\_\_\_

**5、Electronic Characteristics of Module :**

1.Input Voltage :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
2.Supply Current :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
3.Driving Voltage for LCD :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
4.Contrast for LCD :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
5.B/L Driving Method :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
6.Negative Voltage Output :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
7.Interface Function :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
8.LCD Uniformity :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
9.ESD test :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____
10.Others :	<input type="checkbox"/> Pass	<input type="checkbox"/> NG , _____

**6、Summary :**

RAYSTAR OPTRONICS

Sales signature : \_\_\_\_\_

Customer Signature : \_\_\_\_\_

Date : / /